

Review of the California Ambient Air Quality Standards for Ozone



Air Resources Board



**Office of Environmental
Health Hazard Assessment**

California Environmental Protection Agency

What Are the Elements of an Ambient Air Quality Standard?

- Air Quality Standard: legal definition of clean air
- Standards have five parts:
 - Pollutant definition
 - Concentration
 - Averaging time
 - Monitoring Method
 - Form, in CA, not to be exceeded

Standard Setting Does Not Include

- Attainment designation
- Feasibility of controls
- Cost of controls
- Implementation of controls

Why Are We Concerned about Ozone?

- Health effects are significant
- Body of evidence is substantial
- Exposure is high in California
- Children may be particularly vulnerable

Who is Most at Risk?

- Primarily an outdoor pollutant
- Health effects proportional to inhaled dose of ozone
- Greatest risk to people who are active outdoors
 - Adults who exercise or work outdoors
 - Children

Current Ozone Standards (ppm)

	One Hour	Eight Hour
California	0.09	--
US EPA	0.12	0.08*

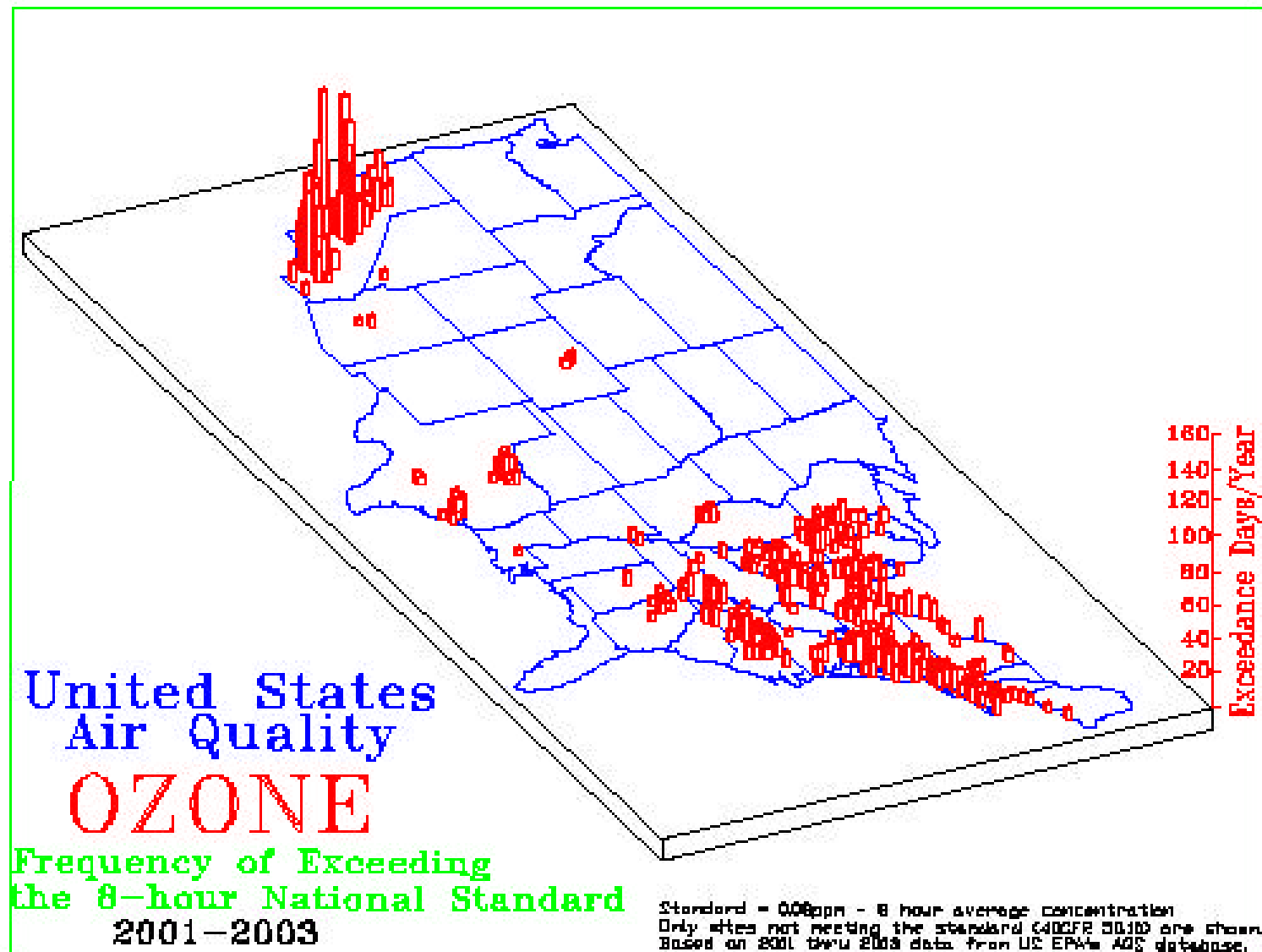
*selected from a range of 0.07 to 0.09 ppm

State Nonattainment Area Classification Map

Ozone 1-Hr Standard



National 8-Hr O₃ Standard Exceedances



Draft Recommendation to Revise the California Ozone Standard

- Retain ozone as the pollutant definition
- Establish a new 8-hr standard of 0.070 ppm, not to be exceeded
- Retain the current 1-hr standard of 0.09 ppm, not to be exceeded
- Retain the UV monitoring method

What Are the Health Effects of Ozone?

- Reduced lung function
- Respiratory symptoms
- Airway inflammation
- Increased hospital and ER usage
- Increased school absenteeism
- Asthma induction in active children (needs confirmation)

Controlled Human Studies (1 to 3 Hours): Lowest Concentrations Showing Effects

- Lung Function Decrements: 0.12 ppm
- Increased Respiratory Symptoms: 0.12 ppm
- Increased Airway Resistance: 0.18 ppm
- Airway Inflammation: 0.20 ppm

Studies of Multi-Hour Ozone Exposures: Lowest Concentrations Showing Effects

- Lung function decrements: 0.08 ppm
- Increased respiratory symptoms: 0.08 ppm
- Increased airway reactivity: 0.08 ppm
- Airway inflammation: 0.08 ppm

Influence of Demographics and Ethnicity on Responsiveness

- Few studies conducted
- Factors Investigated
 - Gender
 - Age
 - Socioeconomic Status
 - Ethnicity
- Insufficient data to draw conclusions

Findings From Animal Studies

- Acute responses similar to humans:
 - Increased airway resistance
 - Airway inflammation
- Repeated injury-repair cycles can cause fibrosis (> 0.25 ppm)
- Changes in airway architecture with chronic exposure to high O₃ concentrations (> 0.20 ppm)

Findings From Epi Studies

Ambient concentrations of ozone have been associated with:

- Respiratory hospital admissions
- Emergency room visits
- Asthma exacerbation
- School absences and respiratory symptoms
- New onset of asthma (with exercise)
- Reduced lung function with long term exposure
- Mortality

Basis for OEHHA's Health-Based Recommendation

Retain the current 1-hr standard of 0.09 ppm

- Chamber studies report lung function and symptoms effects at 0.12 ppm
- Epi studies suggest adverse effects below 0.12 ppm
- Epi studies on ER visits suggest a lowest effect level in the range of 0.075 to 0.11 ppm

Basis for 1-hr (cont.)

- Includes a safety margin to protect children and other susceptible groups
- Protects against airways inflammation
- Protects against peaks in areas that may meet federal 8-hr standard of 0.08 but still have relatively high 1-hr concentrations.

Basis for OEHHA's Health-Based Recommendation

Establish an 8-hr standard of 0.070 ppm

- Chamber studies report symptoms, lung function changes, and airway responsiveness effects at 0.08 ppm
- Some individuals exhibited large changes with 6.6 hr exposure to 0.08 ppm
- Epi studies suggest adverse effects at 8-hr concentrations less than 0.08 ppm

Basis for 8-hr (cont.)

- Studies on ER visits suggest a lowest effect level in the range of 0.065 to 0.09 ppm
- Includes a safety margin for highly responsive individuals, children and other susceptible groups
- Increases protection in areas that meet 1-hr 0.09 ppm but still have 8-hr averages between 0.07 and 0.08 ppm.

Findings on Infants and Children Under SB 25

- No evidence that children respond at lower O₃ concentrations than adults
- Exposure patterns:
 - Frequent high exposures due to outdoor activity
 - Greater exposure per unit lung surface than adults
- Susceptibility: Early exposure may
 - Affect lung development
 - Reduce lung function
 - Induce asthma

Findings on Infants and Children (cont.)

- No evidence for interactions between pollutants
- Adverse health outcomes reported include:
 - asthma exacerbation and ER visits
 - hospital admissions
 - school loss
 - upper and lower respiratory symptoms
 - possible onset of asthma
 - decreased lung function in young adults raised in high ozone areas

Summary:

Draft Staff Recommendation

- Retain ozone as the pollutant definition
- Establish a new 8-hr standard of 0.070 ppm, not to be exceeded
- Retain the current 1-hr standard of 0.09 ppm, not to be exceeded
- Retain the UV monitoring method

Quantifying the Health Benefits of Reducing Ozone Exposure

Estimated impact on health is the product of:

- Changes in ozone concentrations
- Population exposed
- Baseline incidence of health outcomes
- % change in health outcome per unit increase in ozone based on evidence from epi studies

Public Health Benefits Associated With Attainment of the Proposed Standards

Estimated reductions:

- 640 premature deaths
- 3,800 hospitalizations for respiratory diseases
- 130 emergency room visits for asthma for children under 18 years of age
- 3.3 million school absences among children for ages 5 to 17 years of age
- 2.6 million minor restricted activity days for adults above 18 years of age

Timeline for Ozone Review

Jun. 21	Release of Draft Report
Jul. 14-16	Public Workshops
Aug. 25	Public Workshop
Sept. 1	Public Comments Due
Oct. 2004	AQAC meeting (tentative)
Dec. 2004	Final recommendations to Board (tentative)

Contact Information

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